# UNITED STATES PATENT AND TRADEMARK OFFICE

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/766,786 | 01/27/2004 | Daniel C. Guterman | SAND-01015US0 | 3988 |

| | | | EXAMINER |
|---|---|---|---|
| 28554 | 7590 | 04/04/2005 | TRAN, MICHAEL THANH |

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| ART UNIT | PAPER NUMBER |
|---|---|
| 2827 | |

DATE MAILED: 04/04/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/766,786 | GUTERMAN ET AL. | |
| | Examiner | Art Unit | . |
| | Michael t. Tran | 2827 | |

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

1)☒ Responsive to communication(s) filed on _January 27, 2004 through February 17, 2004_.
2a)☐ This action is **FINAL.**     2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under _Ex parte Quayle_, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

4)☒ Claim(s) _1-46_ is/are pending in the application.
    4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☒ Claim(s) _16,17,19-32,34 and 46_ is/are allowed.
6)☒ Claim(s) _1-3,11-14,33,35-39 and 41-45_ is/are rejected.
7)☒ Claim(s) _4-10,15,18 and 40_ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

## Application Papers

9)☐ The specification is objected to by the Examiner.
10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a)☐ All   b)☐ Some * c)☐ None of:
      1.☐ Certified copies of the priority documents have been received.
      2.☐ Certified copies of the priority documents have been received in Application No. _____.
      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
    * See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

1)☒ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _021704_.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.
5)☐ Notice of Informal Patent Application (PTO-152)
6)☐ Other: _____.

MICHAEL TRAN
PRIMARY EXAMINER

# DETAILED ACTION

1.  In response to the Communications dated January 27, 2004 through February 17, 2004, claims 1-46 are active in this application.

## *Information Disclosure Statement*

2.  The information disclosure statement filed February 17, 2004 has been considered.

## *Claim Objections*

3.  Claims 4-10, 15, 18, 40, and 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

## *Claim Rejections – 35 U.S.C. § 102*

4.  The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in-
(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

5.  Claims 1-3 and 11-14 are rejected under 35 U.S.C 102(e) as being anticipated by Mokhlesi et al. [U.S. Patent #6,856,551].

With respect to claim 1, Mokhlesi et al. disclose an apparatus for programming comprising: a non-volatile storage element [101 of figure 1] having a gate and two control terminals [source and drain]; and a switchable current sinking device [403 of figure 4a] in communication with one of said control terminals, said switchable current sinking device provides a coarse current sink to said one of said control terminals if said non-volatile storage element is in a coarse programming mode and provides a fine current sink to said one of said control terminals if said non-volatile storage element is in a fine programming mode. See columns 10-14. In the cited sections, Moklesi et al. indicate that the different mode of programming is dependent upon the setting of the current sinking device.

With respect to claim 2, Mokhlesi et al. indicate that the coarse current sink is a greater current sink than the fine current sink. See columns 10-14.

With respect to claim 3, Mokhlesi et al. indicate that the switchable current sink device includes a single current sink that can operate in two current sink modes. See columns 10-14. In the cited sections, Mokhlesi et al. state that element 403 is capable of producing a particular current in a particular programming mode.

With respect to claim 11, Mokhlesi et al. disclose that the two control terminals are bit lines [BL.alpha.0 and BL.alpha.1]. See figure 1.

With respect to claim 12, Mokhlesi et al. disclose that the control terminal is a

source terminal. The source of a particular cell is connected to a bit line. See figure 1.

With respect to claim 13, Mokhlesi et al. disclose that the non-volatile storage

element is a flash memory element. See the "Background of the Invention" section.

With respect to claim 14, Mokhlesi et al. disclose that the non-volatile storage

element is a multi-state flash memory element. See the "Background of the Invention"

section.


6. Claim 33 is rejected under 35 U.S.C 102(e) as being anticipated by

Mokhlesi et al. [U.S. Patent #6,856,551].

With respect to claim 33, Mokhlesi et al. disclose an apparatus for programming

comprising: means for performing coarse programming phase [443 of figure 4a] for non-

volatile storage elements; means for sinking a first current [445 of figure 4a] during said

coarse programming phase; and means for switching to fine programming [421 of figure

4a] for said non-volatile storage elements by switching said sinking to a second current.


7. Claims 35-39 are rejected under 35 U.S.C 102(e) as being anticipated by

Mokhlesi et al. [U.S. Patent #6,856,551].

With respect to claim 35, Moklesi et al. disclose a method for programming

comprising: performing a coarse programming phase [503 of figure 5] for a non-volatile

storage element, said coarse programming phase includes sinking a first current; and

switching [529 of figure 5] to a fine programming phase for said non-volatile storage

element by switching said sinking to a second current. See columns 10-14. In the

cited section, Moklesi et al. indicate that the different mode of programming is
dependent upon the setting of the current sinking device.

With respect to claim 36, Moklesi et al. disclose a method further comprising:
determining whether a threshold voltage of said non-volatile storage element has
reached a first verify level, said step of switching is commenced when said threshold
voltage of said non-volatile storage element has reached said first verify level; and
determining whether said threshold voltage of said non-volatile storage element has
reached a second verify level, said fine programming phase is completed when said
threshold voltage of said non-volatile storage element has reached said second verify
level. See figure 5.

With respect to claim 37, Moklesi et al. disclose that the first current is greater
than said second current. See columns 10-14. In the cited columns, Moklesi et al.
indicate that the sink current device [403 of figure 4a] produces two different currents,
one smaller than the other.

With respect to claim 38, Mokhlesi et al. disclose that the non-volatile storage
element is a flash memory element. See the "Background of the Invention" section.

With respect to claim 39, Mokhlesi et al. disclose that the non-volatile storage
element is a multi-state flash memory element. See the "Background of the Invention"
section.

8.   Claims 41-45 are rejected under 35 U.S.C 102(e) as being anticipated by
Mokhlesi et al. [U.S. Patent #6,856,551].

With respect to claim 41, Mokhlesi et al. disclose a method for programming comprising: applying a program voltage signal to a non-volatile storage element; sinking a first current from said non-volatile storage element to perform coarse programming [503 of figure 5]; determining that a threshold voltage of said non-volatile storage element has reached a first verify level [507 of figure 5]; switching said sinking to sink a second current in response to determining that said threshold voltage of said non-volatile storage element has reached said first verify level, said step of switching causes said non-volatile storage element to perform fine programming [529 of figure 5]. See figure 5.

With respect to claim 42, Moklesi et al. disclose that the first current is greater than said second current. See columns 10-14. In the cited columns, Moklesi et al. indicate that the sink current device [403 of figure 4a] produces two different currents, one smaller than the other.

With respect to claim 43, Mokhlesi et al. disclose that the non-volatile storage element is a flash memory element. See the "Background of the Invention" section.

With respect to claim 44, Mokhlesi et al. disclose that the non-volatile storage element is a multi-state flash memory element. See the "Background of the Invention" section.

With respect to claim 45, the program voltage is applied to a control gate of said non-volatile storage element. See columns 10-14.

### *Allowable Subject Matter*

9.  Claims 16, 17, 19-32, 34, and 46 are allowable over the prior art of record.

10. The following is an Examiner's statement of reasons for the indication of allowable subject matter: the prior art of records does not show (in addition to the other elements in the claim) the following:

- A programming mode indication circuit providing an output indicating whether said non-volatile storage element is in said coarse programming mode or said fine programming mode based on said sense circuit, said switchable current sinking device is in communication with said programming mode indication circuit and switches between said coarse current sink and said fine current sink based on an output from said programming mode indication circuit.

- Said switchable current sink device includes a first current sink unit that provides said coarse current sink, a second current sink unit that provides said fine current sink, and a switch for selecting either said first current sink unit or said second current sink unit.

- A selection circuit in communication with said programming mode indication circuit and said sense circuit, said selection circuit provides a coarse reference signal to said sense circuit if said non-volatile storage element is in said coarse programming mode and provides a fine verification signal to said sense circuit if said non-volatile storage element is in said fine programming mode.

- Said switchable current sinking device provides different coarse current sinks to said one of said control terminals for different states and provides different fine current sinks to said one of said control terminals for different states.

- A switchable current sinking device in communication with said programming mode indication circuit and said non-volatile storage element, said switchable current sinking device circuit provides a coarse current sink to said non-volatile storage element if said non-volatile storage element is in said coarse programming mode and provides a fine current sink to said non-volatile storage element if said non-volatile storage element is in said fine programming mode.

- One or more switchable current sink circuits in communication with said non-volatile storage elements, said one or more current sink circuits cause a first subset of said non-volatile storage elements in a coarse programming phase to be subjected to a first current sink while concurrently a second subset of said non-volatile storage elements in a fine programming phase are subjected to a second current sink.

- Switching to a fine programming phase for said non-volatile storage elements by switching said sinking to a second set of current such that non-volatile storage elements being programmed to different states sink different currents of said second set of currents.

### Conclusion

11. When responding to the Office action, Applicants are advised to provide the

Examiner with line and page numbers of the application and/or references cited

to assist the Examiner in the prosecution of this case.

12. Any inquiry concerning this communication or earlier communications from

the Examiner should be directed to Michael T. Tran whose telephone number is (571)

272-1795. The Examiner can normally be reached on Monday-Thursday from 7:30-

6:00 P.M.

13. Any inquiry of a general nature or relating to the status of this application

should be directed to the Group receptionist whose telephone number is (571) 272-

1650.

Michael T. Tran
Art Unit 2827
March 29, 2005

MICHAEL TRAN
PRIMARY EXAMINER